

FENCE POST ACCESSORY APPARATUS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Patent Application No. 09/974,101
5 entitled: "Fence Post Assembly," having a filing date of October 10, 2001; and U.S.
Patent Application No. 29/193,554 entitled: "Lantern Assembly," having a filing date of
November 10, 2003. The contents of each are incorporated by reference herein as if set
forth in full.

FIELD OF THE INVENTION

10 The field of the invention relates generally to fencing, particularly synthetic
fencing components constructed of synthetic materials such as plastic and vinyl. More
specifically, the invention relates to an apparatus for attaching various components to the
top of a hollow fence post.

BACKGROUND

15 Recently, there has been a tremendous increase in the use of synthetic fencing
products. The popularity of synthetic fencing is due in part to its low maintenance; for
example, vinyl fencing retains its color and need not be stained or otherwise treated every
20 year to prevent decay. Additionally, synthetic fencing can take on the natural, attractive
appearance of wood while exhibiting superior durability. Furthermore, since synthetic
posts and their connecting members are hollow, electrical connections can be routed
through the fence and hidden from view, allowing electrical accessories to be easily

wired along the fence. Finally, synthetic fencing components are less expensive to mass-produce and easier to assemble than their wood counterparts.

Synthetic fencing does present several design challenges. For example, people often desire to mount various accessories on their fence posts such as rain gauges, bird
5 feeders, lights, etc. Unlike a wooden post on which an accessory may be easily mounted using nails or screws, securely attaching accessories to a synthetic fence can be difficult as synthetic fence posts are typically hollow and lack the internal structure to support heavy objects attached to their side using conventional means such as nails or screws. Additionally, the use of nails or screws may cause structural damage to the fence post,
10 possibly causing splitting or cracking. Another design challenge is to provide a means to securely attach decorative or functional accessories to the synthetic fence where the attachment means shares the aesthetic and durability qualities of the synthetic fence such that the appearance of the synthetic fence may be enhanced.

SUMMARY OF THE INVENTION

In view of the foregoing, it is the principal object of the present invention to provide an apparatus for realizing enhanced decorative capabilities with synthetic fencing.

It is a further object of the present invention to provide an apparatus for securely
20 attaching accessories to a synthetic fence post without structurally degrading the fence post, which is aesthetically pleasing.

It is a further object of the present invention to provide a means to enhance the decorative appearance of a synthetic fence that is easily retrofit to the fence.

In accordance with the above objectives, the inventors have recognized that most synthetic fences contain a simple cap covering the open end of a hollow post and that by replacing this cap with attachments that are more decorative or styled a synthetic fence can take on an appearance more like that of a sculpted wooden fence. Accordingly, the inventors recognized the need to provide an apparatus that allows various sized accessories to interface with the synthetic fence posts while providing good structural support and not degrading the fence posts' integrity. Additionally, the inventors have recognized that the apparatus should be aesthetically pleasing to the eye, easy to manufacture, and should be made such that it may be retrofit onto an existing synthetic fence with minimal effort.

These and other objects are achieved by the present invention. In one embodiment, the present invention provides a synthetic fence post assembly comprising a connector member with two substantially parallel interface surfaces for placement on the end of a synthetic fence post and a top member for placement on the connector member. More particularly, the connector member is designed such that a first interface surface engages the end of a synthetic fence post and provides a second interface surface, which may engage the top member. Additionally, these interface surfaces contain engaging means for attaching the connector member to the interfacing structures (e.g., the post and top member). Once the connector member is attached to the fence post, a secure base is provided for mounting an accessory to the fence post without degrading the post's structural qualities.

The engaging means refer to one or more members that extend from the connector member across the interface plane as defined by the connector member and an interfacing

structure. These members may extend perpendicular from the interface planes and be slidably received within their respective interfacing structure or slidably receive their respective interfacing structure. For example, the member(s) that make up the engaging means may comprise multiple tabs that fit within the hollow opening of an interfacing structure, such as a fence post, or may comprise a continuous wall that fits over and slidably receives the end of an interfacing structure. Additionally, the connector member may be configured such that both interface surfaces have the same engaging means or such that each interface surface contains a different engaging means.

The top member may be any attachment configured such that it interfaces with, and is supported by the connector member, such as a decorative cap (e.g., a ball, tetrahedron, etc.) or an accessory such as a lamp. In one embodiment, the top member has a hollow elongate body that, when used with the connector member, allows the synthetic fence to take on the appearance of a sculpted wooden fence. In another embodiment, the top member comprises a housing for a lamp that contains apertures along its body that allow light to pass from within the structure upon assembly. In this embodiment, the apertures may be left open or covered with translucent caps that may diffuse the light as it passes from within the top member while sealing the top member from the elements.

The use of a hollow top member (e.g., an elongate tube) with the connector member will generally require using a cap to seal the top member's second end from the elements. This cap may be anything configured to interface with and seal the top member from the elements, such as, for example, the simple caps that were originally on the synthetic fence posts. Additionally, the cap may itself be a decorative or functional

accessory. For example, in one embodiment the cap may be a solar light apparatus comprising a solar panel oriented on top its top, a battery operable to receive an electrical charge from the solar panel, and a light connected to the battery on the bottom of the cap such that the light is enclosed within the top member upon assembly. As will be appreciated, when using a solar cap assembly, a light may be retrofit onto an existing synthetic post using the connector member and apertured top member of the present invention without having to perform any electrical wiring through the synthetic fencing.

In another embodiment, the present invention provides a synthetic fence post assembly comprising: a connector member comprising two substantially parallel interface surfaces for placement on the end of a synthetic fence post, an exterior sidewall and an interior sidewall disposed between the interface surfaces that collectively define an opening, an internal support mount connected to the internal sidewall within the opening, and a top member for placement on the connecting member.

The connector member's internal support mount may be connected to the interior sidewall using a plurality of interconnecting members that extend from the interior sidewall to the edge of the support mount. The support mount will generally be configured such that it forms an enclosure for receiving and holding an accessory in axial alignment with the center of the post. For example, the support mount may be formed as a ring where the ring's internal edge is open to receive/hold an accessory with a circular base. However, other configurations of the support mount are possible, such as, for example, a pin that is slidably receivable within an accessory. As will be appreciated, use of the internal support in conjunction with the connector member allows the synthetic fence post to support an accessory with a significant weight, since the post will carry the

entire weight of an accessory so mounted in compression across its cross section. Additionally, this arrangement allows for supporting an accessory without any degradation of the fence post's structural integrity caused by mechanical fasteners such as nails and screws applying a force to a concentrated point on the post's sidewall.

5 In another embodiment, a fence post assembly is provided comprising a substantially translucent or transparent connector member and a top member for placement on the substantially translucent connector member. The translucent connector member comprises two substantially parallel interface surfaces each of which contain engaging means for engaging an interfacing structure, one of these engaging means may
10 be designed to interface with the end of a fence post. The transparent connector further comprises an interior and exterior sidewall disposed between the interface surfaces that integrally define an opening which is axially aligned with the fence post. As will be appreciated, this sidewall area may provide an enclosed space within the transparent connector member for placement of an accessory such as a light. In this regard, the
15 connector member forms a lens having one engaging means for interfacing with the end of a fence post and another engaging means for interfacing with a lamp. The transparent connector member also comprises a diffusing means on the surface of at least one of the interior and exterior sidewall. This diffusing means may be any coating or physical variation on the sidewall surfaces which act to disperse light that may emanate from
20 within the transparent connector member. In one embodiment using a physical variation of the sidewall surface, the diffusing means comprises a plurality of ridges integrally formed on the interior surface. These ridges may be continuously spaced on the surface

and may be oriented perpendicular to said first and second interface surfaces. In this regard, the ridges may be easily formed in, for example, an injection molding process.

In all aspects of the present invention, the connector member may be formed in a variety of geometric shapes as long as it provides a first interface surface for engaging the synthetic post and a second interface surface for engaging a top member. For aesthetic purposes the connector member will typically share the geometry of the fence post (e.g., square post, square connector); however, the connector member may be formed such that it interfaces a post and top member of different cross sectional geometries (e.g., square to circular etc.) and/or diameters.

A method is also provided in accordance with the present invention for attaching an accessory to a synthetic fence post. The method includes the steps: defining an opening on the end of a fence post, providing a connector member with two interface surfaces that contain engaging means, positioning the connector member on the fence post such that the engaging means engage the post, placing an accessory on the connecting member such that the engaging means engage the accessory, and securing the engaging means to the post and accessory using a fastening means.

Additional aspects advantages of the present invention will become apparent upon consideration of the further description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows an exploded perspective view of the synthetic fence post assembly as oriented atop a synthetic fence post.

Fig. 2 shows a perspective view of the connector member and its internal support mount.

Fig. 3 shows a plan side view of the connector member.

Fig. 4 shows an exploded perspective view of the synthetic fence post assembly
5 incorporating a light fixture.

Fig. 5 shows a perspective view of a translucent connector member with a solar light cap top assembly.

Fig. 6 shows an exploded perspective view of another synthetic fence post assembly.

10 Fig. 7 shows a side view of a connector member utilized with the embodiment of Fig. 6.

Fig. 8 shows an exploded perspective view of another synthetic fence post assembly.

Figs. 9a-9c show a surface finish utilized with a translucent connector member.

15 Figs. 10a –10d show one embodiment of a solar light cap assembly.

DETAILED DESCRIPTION

Referring to Fig. 1, there is shown an exploded perspective view of one embodiment of the present invention. As shown, a synthetic fence post assembly 5 is
20 placed on the upper end of a synthetic fence post 10, allowing a homeowner to add a decorative accessory to their synthetic fence posts such that these fence posts look more like sculpted wooden posts with a notch engraved about their circumference. In the illustrated embodiment, the synthetic fence post 10 is hollow such that the upper end

forms a cavity 12. The connector member 20 interfaces with the hollow end of the synthetic fence post 10 using a plurality of downward-facing tabs 22 arranged about the connector member's lower peripheral edge and oriented such that they are perpendicular to the interface plane between the post 10 and the connector member 20. These
5 downward-facing tabs 22, only two of which are shown in Fig. 1, are disposed such that they are slidably receivable within the fence post cavity 12. Typically, the tabs 22 will be constructed such that they nest securely within the cavity 12 and thereby prevent undesired lateral movement of the connector member 20 and provide some resistance to removal. To further secure the connector member 20, the engaged tabs may be affixed to
10 the interior post wall using an adhesive or, if removal of the connector is required in the future, a mechanical means such as a screw.

The top member 50 of the synthetic fence post assembly 5 interfaces with the connector member 20 and is supported thereby. In Fig. 1 the top member 50 is shown with a hollow elongate body. This top member may be made of the same material as the
15 synthetic fence post and contain the same geometric cross-section. The top member 50 is connected to the connector member 20 using upward-facing tabs 24 on the connector member's upward peripheral edge. These upward-facing tabs 24 are again disposed such that they are perpendicular to the interface plane between the connector member and the top member and are slidably receivable within the top member 50. Last, a cap 70 is
20 placed atop the top member 50 to seal the assembly from moisture and debris. In the illustrated embodiment, the cap 70 contains downward-facing tabs 72 that slidably fit within the top member 50.

Figs. 2 and 3, show a perspective and side view of the connector member 20 respectively. As shown, the connector member 20 contains a recessed main body 26, a lower shoulder 28 with a lower interface surface 29, an upper shoulder 30 with an upper interface surface 31, a plurality of downward-facing tabs 22 and a plurality of upward-facing tabs 24. More particularly, the main body 26, located between the interface surfaces 29 and 31, comprises an exterior sidewall 32 as shown in Fig. 3 and an interior sidewall 34 as shown in Fig. 2. The exterior sidewall 32 and interior sidewall 34 form an opening 36 that, in the illustrated embodiment of Fig. 1, shares the same basic geometry as the end of the synthetic fence post 10. This opening 36 is axially aligned with the synthetic fence post cavity 12 when the connector member 20 is interfaced with the synthetic fence post 10. Contained within the opening 36 is a support mount 38 for axially aligning and supporting accessories on and/or within the fence post 10. The support mount 38 is connected to the interior sidewall 34 by a plurality of interconnecting members 40. The interconnecting members 40 are shown disposed in an opposing relationship with one another but may be arranged in any fashion that effectively supports the support mount 38. As shown, support mount 38 comprises a ring with an open center for receiving and supporting accessories; however, this mount 38 may be made of any geometrical shape that will fit inside the opening 36 and provide an attachment surface for an accessory. For example, if an accessory had an octagonal base, the support mount may be formed accordingly to support this geometry.

The connector shoulder members 28 and 30 each contain a smooth interface surface 29 and 31 on which their respective interfacing structures rest. The upper interface surface 31 supports the top member's lower sidewall 61 (see Fig. 1), while the

lower interface surface 29 rests atop the fence post sidewall 11. As shown, interface surfaces 29 and 31 are oriented such that the interface planes defined by each are parallel. As will be appreciated this ensures that an accessory mounted to the fence will be squarely aligned with the end of the fence post. Additionally, the connector shoulder members 28 and 30 are sized such that they match the outside perimeter of their
5 respective interface structures upon assembly. For example, as shown in the side view of Fig. 3, the bottom shoulder 28 and interface surface 29 extend a short distance beyond the downward-extending tab 22. This distance is equal to the sidewall thickness of the synthetic fence post 10 such that when the connector member 20 is placed on top of the
10 synthetic fence post 10 the downward-facing tabs 22 will fit inside the fence post cavity 12 and the shoulder 28 will extend to match the peripheral edge of the synthetic fence post. The top shoulder 30 interfaces in a similar manner with accessories attached thereto.

Connector member 20 and post 10 are shown in the illustrations with a square
15 cross-sectional shape; however, it will be understood that other shapes may be utilized depending on aesthetic preferences. For example, the connector member may be configured such that the lower shoulder 28 interfaces with a post with a square cross-section while the upper shoulder supports a top member with a round cross-section, or vice-versa. Additionally, the connector member 20 may be sized such that it connects a
20 post of one diameter to an accessory of a second diameter. For example, synthetic posts typically come in diameters of four and five inches and various accessories exist for either of these sizes. However, an accessory for a five-inch fence post will not generally fit a four-inch post. Therefore, the connector member may be sized such that the bottom

interface surface fits a post of a first size and the top interface surface supports an accessory of a second size, thus increasing the amount of options for homeowners in decorating their fences.

Generally, the connector member 20 will be made of a plastic material such as polyvinyl chloride (PVC) or other suitable plastic material such that it shares the durability and aesthetic qualities of the synthetic fence. Additionally, for structural integrity the support member 38 connecting members 40 and the interior sidewall 34 may be an integrally formed unit.

Fig. 4 shows an exploded perspective view of another embodiment of the present invention. In this embodiment, hollow top member 50 further comprises a plurality of apertures 52 about its elongate body to allow light to pass from within. Translucent lenses 54 may be attached to these apertures 52 to seal the top member 50 from the elements and diffuse the light as it passes through. Further, a light assembly 80, supported by the support mount (not shown), extends into the top member 50 upon assembly such that the light bulb 81 is nearly level with the apertures 52. As will be appreciated, the embodiment of Fig. 4 allows for an enclosed light assembly to be mounted on the end of a synthetic fence post 10 wherein all wiring 82 may be routed through the post and thus, hidden from view. If desired, the connector member 20, the top member 50, and the cap member 70 may be made of the same material and color as the fence post 20, providing an aesthetically pleasing light assembly that is easily retrofit onto an existing synthetic fence.

Fig. 5 shows an exploded perspective view of another embodiment of the present invention. In this embodiment, a differently configured lens member 90 is shown that

may be used to interconnect the synthetic fence post 10 and a top member 50. In this embodiment, the lens member 90 is substantially transparent such that light may pass from within the member. In this regard, the lens member 90 forms, in effect, a lens for placement/mounting on the end of a post where the lens is also capable of supporting a light mounted thereon. Again, the lens member 90 contains downward extending tabs 22 that are disposed such that they are slidably received within the post cavity 12. However, the main body 26 is not recessed in relation to the upper and lower shoulders 30 and 28. Additionally, in place of upward facing tabs for engaging a top member or accessory, lens member 90 has a continuous upward-facing side wall 92 connected around the periphery of the upper shoulder 30 which fits over the outside perimeter of a top member. Alternatively, the upward-facing sidewall 92 may be slidably received within a top member 50 such that the top member 50 rests on the upper edge 93 of the upward facing side wall 92. In this configuration, the top member 50 may be attached to the upward-facing sidewall 92 using an adhesive or mechanical fastener. In this embodiment, the lens member 90 again contains an exterior sidewall 32 and an interior sidewall 34 which integrally define an enclosure. However, in this embodiment, the interior sidewall 32 contains a plurality of continuously spaced ridges 97 oriented perpendicular to the interface plane formed by the lens member 90 and the fence post 10 upon assembly. As shown, the ridges 97 extend between the lower shoulder 28 and the upper shoulder 30. These ridges are designed to diffuse any light emanating from within the assembly 5. Fig. 5 also shows a solar voltaic cap 100 as the top member 50. The solar voltaic cap member 100 comprises a solar collector 102 that is mounted on top of the cap 100, a battery (not shown) in electrical communication with and charged by the solar collector,

and a light 104. The light may be configured such that it only operates at night using energy stored by the battery during the daylight hours. As will be appreciated, if the solar voltaic cap member is used with a translucent lens member 90, a lighting assembly is provided that may be retrofit onto a synthetic fence without the requirement of any wiring. In addition, the translucent connector's 90 downward facing engaging means may be configured with a continuous downward facing wall that is operative to fit over and slidably receive the end of a fence post. In this regard, this lens member 90 may be retrofit onto existing wooden fence posts that lack an internal cavity to slidably receive an attachment means such as tabs.

Figure 6 shows another embodiment of the fence post that includes a top member or cap 70, a lens 90, connector member 20, and a fence post 10. As shown, the embodiment of Figure 6 again utilizes a substantially transparent lens member 90 to form a lens for lamp assembly. However, in this embodiment, the lens member 90 is not directly interconnected to the fence post 10. Rather, a connector member 20 is disposed between the bottom surface of the lens member 90 and the fence post 10. In this regard, a standardized transparent lens member 90 may be interconnected to a variety of differently sized fence posts 10 utilizing differently configured connectors 20.

To fit the lens member 90 to differently sized fence posts 10, the connector 20 may be formed in a variety of different sizes. In this regard, the connector 20 may have a first interface surface 31 having a first size and a second interface surface 32 having a second size. See Figure 7. Further, it will be noted that the interface surfaces 31, 32 may be differently shaped (e.g., square and round, respectively) and may utilize different methods for connecting to interfacing structures. For instance, the lower interface surface

32 may incorporate a continuous sidewall for placement around the fence post 10 (e.g., for use with solid fence posts) or, may utilize downwardly extending tabs for placement within hollow fence posts 10. Likewise, the upper interface surface 31 may utilize any applicable means for engaging the lens member 90. What is important, is that the
5 connector 20 provides interface for interconnecting a standard lens member 90 to a variety of differently configured posts 10.

Figure 8 shows a further embodiment of the fence post assembly 5. As shown, the assembly 5 again includes a cap 70, a lens 90, connector member 20, and a fence post 10. Figure 8 is included to show that while the individual components of the assembly 5
10 may be differently shaped, they are still considered to be within the scope of the invention.

Figures 9a-9c show one embodiment of a surface treatment that may be formed on an inside surface, or, an outside surface of the lens assembly 90. As shown in Figure 9a, a sidewall surface 92 of the lens 90 includes a surface treatment (e.g., a physical
15 variation on the surface of the sidewall 92) for use in diffusing light that may emanate from within the lens member 90. Figure 9b shows a cross-sectional view of the lens 90 and Figure 9c shows a close up view of the inside surface of the lens 90. As shown, the inside surface of the sidewall 92 is formed with a series of horizontally aligned ridges 96 in a stair step configuration. Of note, each ridge 96 is formed continuously around the
20 perimeter of the inside surface (i.e., cavity) of the lens 90. Furthermore, each ridge has a perimeter that is sized larger than the perimeter of the ridge below. In this regard, ridge 96c has a perimeter larger than ridge 96b, which has a perimeter larger than ridge 96a, etc. Further, it will be noted that the lens 90 is generally tapered from its bottom surface

to its top surface. This allows for injection molding of the lens 90 wherein a tool having an outside surface tapered in an opposite manner of the lens 90 can be retracted from the cavity 98 after formation of the lens 90. Such a tool may include the stair step ridges about its perimeter. In this regard, the lens member 90 and a diffusing surface finish for the lens member 90 may be formed in a single injection molding process.

Figures 10a-10d show one embodiment of a solar cap 70 that may be utilized with the assembly 5. The cap 70 includes an aperture 74 through its top surface that is sized to receive a solar collector 102. Preferably, the solar collector 102 will be sized larger than the aperture 74 such that the solar collector may be retained within the cap 70. When utilizing a solar collector 102, it may be desirable to prevent water from accumulating on top of the collector 102. Accordingly, the cap 70 as shown has been designed to allow water to drain through the corners of the aperture 74. In this regard, the corners of the solar collector may be chamfered to produce an opening between the solar collector 102 and the cap 70. Additionally or alternatively, small channels 78 may be formed in one or all of the corners of the aperture 74 to provide a fluid path between the cap 70 and solar collector 102. Further, use of such channels 78 may allow for diverting water from electrical componentry that may be located beneath the solar collector 102.

As shown, the cap 70 includes a light assembly having a solar collector 102, an integrated circuit board 106, a light 104 (e.g., LED), and a battery 108. As shown each of the light assembly components 102-108 are mounted to a light plate 110 that is mounted to the underside of the cap 70. As shown, the light plate 110 includes four recessed screw cups 112 on its bottom surface. Each screw cup 112 includes an aperture through its bottom surface sized to allow a screw 114 to extend through while preventing a head of

the screw 114 from passing through. On the other side of the light plate 110, opposite of each of the screw cups 112 are stud cups 122. The stud cups 122 on the top surface of the plate 110 are sized to receive corresponding studs 120 formed (e.g., molded) onto the bottom of the cap 70. The studs 120 each include a central bore sized to receive the screws 114 extending through the aperture of the screw cups 112 in a threaded engagement. As will be appreciated, the use of the stud cups 122 on the light plate 110 allows for positioning the light plate assembly relative to the cap 70 during assembly, thereby facilitating assembly.

The top surface of the light plate further includes four standoffs 116 (only two shown) that are utilized to hold the solar collector 102 relative to the aperture 74 through the top of the cap 70. In this regard, it will be noted that the solar collector 102 may be held in a simple compression fit. That is, not directly interconnected to the cap 70. However, this is not a requirement. Further, it will be noted that the size of each of the standoffs 116 may be different to account for differences on the top surface of the light plate 110. For instance, the standoff disposed on top of the battery may be shorter than the other standoffs.

In accordance with the above apparatuses, a method is provided for connecting an accessory to the end of a fence post using a connector member. In particular, the method requires defining an opening on the end of an existing synthetic fence post. As will be appreciated, this is typically a simple process, as most synthetic fence posts are hollow and the existing caps may be pried off; however, in some instances, this may entail cutting the synthetic post's sidewall about its circumference such that the existing cap

may be removed. Next, a dual interface connector member containing engaging means on each interface is provided.

The connector member is positioned atop the synthetic fence post such that the engaging means are properly aligned with the post. For example, in the case where tabs
5 are used, the end of the tabs must be oriented inside the post sidewall. Once the engaging means is properly aligned, pressure is applied such that the engaging means seat with the fence post. Once the connector member is securely interfaced with the fence post (i.e., flushly mounted), an accessory may be placed on the connector member's second interface surface such that the second engaging means are properly aligned with the
10 accessory. Again, force is applied to set the engaging means with the accessory. Additionally, in the case of an electrical accessory, the step of placing may further entail routing wires through the connector member and into the hollow of the post so they are hidden from view.

Once both interface surfaces are flushly mounted with their respective interfacing
15 structures, they may be secured thereto using a fastening means. Generally, an adhesive or mechanical means will be used to secure the connector member to the interfacing structures. As will be appreciated, if further access is required to within the accessory, a removable mechanical fastener such as a screw is preferable.

The embodiments described above are for exemplary purposes only and are not
20 intended to limit the scope of the present invention. Various adaptations, modifications and extensions of the described assembly will be apparent to those skilled in the art and are intended to be within the scope of the invention as defined by the claims that follow.